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Green Feed and Pasture for Poultry

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Illustration on cover—

Figure 1. Kale is the best winter green feed.

Green Feed and Pasture for Poultry

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INTRODUCTION

THE object of this publication is to bring to the attention of poultrymen, in brief form, the better methods of producing green feed and pasture, the crops best to use, and the most economical utilization of such crops.

It is very important that a continuous supply of green feed be provided. To do this, a definite cropping system must be arranged and in some sections root storage facilities provided. Systems of providing this feed are presented as suggestions for the various sections where poultry is important. Many plants well adapted for green feed can be grown under a wide range of conditions. There are but few sections where some kind of fresh feed cannot be grown for at least part of the year, and in practically all of them roots can be grown and stored to provide winter succulents.

If maximum results are to be obtained, green feed and pasture crops should be grown in a regular rotation. Liberal manuring or fertilization of the land usually assures better and larger yields. Where the pasture crop is grown on land used as yards, poultry manure may add to the parasite and disease problem and therefore should not be used. Other manure or commercial fertilizers should be used instead. Green feed to be economical must produce heavy yields since production and harvest methods of these succulent crops, on a poultry ranch scale, cannot otherwise compete with mass production of larger farms.

Usually the green feed is grown in part on vacant yards that are being cleaned up by cropping them.

Increased turkey production has developed new problems in connection with providing cheap and plentiful supplies of fresh herbage for pasture, shade, and range, particularly for large flocks.

LOCATION OF PLANTINGS

Areas for production of green feed for poultry should be as convenient as possible to the place of utilization. This is especially true where crops are to be harvested in small quantities by hand methods each day or two. If crops are grown for storage, the location of the field is of minor importance because harvesting is usually done at one time and the transportation problem is small. Fields to be pastured, however, should be close to houses

*Forage crop work at the Oregon Agricultural Experiment Station is conducted in cooperation with the Division of Forage Crops and Diseases, Bureau of Plant Industry, United States Department of Agriculture and credit is hereby acknowledged as jointly due to the above named office and the Oregon Agricultural Experiment Station.

or pens if they are to be utilized to the best advantage. Some fields are also pastured after the crop is removed. This allows more thorough utilization, saves labor, and provides exercise ground for short periods.

GROWING CROPS FOR POULTRY PASTURE

Grains—barley, oats, wheat, and rye. Winter grains are usually selected for this purpose. The special value of these grains is that some of them can be grown on practically any kind of land with reasonable drainage in almost any section of the state. Seedbed preparation is easy and cheap, seed is cheap, the plants are winter hardy, and they supply feed for long periods in early spring.

On land in good condition, oats should be sowed at 3 bushels an acre, and barley, wheat, and rye at 2 bushels an acre. If the use of a grain drill is not practicable, seedings on small areas are usually broadcast and harrowed in. In that event from 30 to 50 per cent more seed should be used. Seedings should be made in the early fall.

Fall-sown barley is ready for spring use first, followed by rye, oats, and wheat. These crops, beginning with barley, are usually ready to cut March 20 to April 1. Early cuttings usually produce second crops. Their use may continue until June 1. By seeding a small area of each grain a maximum period of production is obtained.

Good varieties of winter grain for this purpose for Western Oregon are O. A. C. No. 6 and No. 7 barley, Gray winter, and Support oats, White winter, White Holland and Jenkin Club wheat, and winter rye. For Eastern Oregon, winter barley and oats are often not hardy enough; hence Rosen rye and Hybrid 128 or Fortyfold wheat should be sowed.

Spring barley, wheat, and oats may be used at times; for instance, when winter grains are badly damaged by cold or where a short-time pasture crop is practicable between two long-season crops. Good varieties to sow in Western Oregon are Hannchen barley, Victory or Three-grain oats, and Marquis wheat; in Eastern Oregon, Federation wheat, Markton and Three-grain oats, and Trebi barley.

Fall wheat such as Fortyfold, or rye such as Rosen, sowed in April often gives good summer pasture until quite late.

Vetches. Common and Hungarian vetch are well suited for green feed. They grow on a wide range of soils and in many localities and supply a large amount of high protein green feed. Common vetch is winter hardy in most well drained sections in Western Oregon. Hungarian vetch is more hardy and is better suited to sections in the north end of the Willamette Valley, exposed to the cold winter "East Wind", to some higher, colder locations, and to some soils a little too wet and sour for Common vetch, as in the south central valley region. For the sour and run-down soil and really cold sections Hairy and Smooth vetch are superior. These varieties may be seeded alone or with any of the small grains. It is preferable to seed with the small grains because in combination the vetches grow well, stand up better, the amount of feed is increased and the quality improved. Harvest is also easier. When seeded alone 80 to 100 pounds of Common or Hungarian vetch seed an acre should be used. With Hairy vetch 30 to 50 pounds are enough. Seeded with grain 60 to 80 pounds of

Common or Hungarian or 30 to 40 pounds of Hairy vetch with one and one-half bushels of barley, rye, oats, or wheat are used.

Seedbed preparation is similar to that for the grains when seeded alone. Common and Hairy vetch make better combinations with barley and rye because they are earlier than Hungarian. Hungarian combines well with oats or wheat.

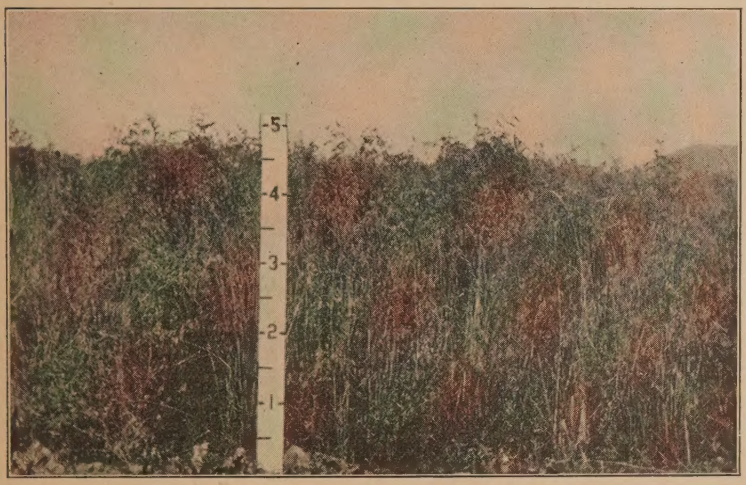

Figure 2. Vetch and oats for early spring feed.

A crop of vetch or vetch and grain is usually ready for cutting or pasturing April 15. By using the various kinds of grain and vetch on rich soils that hold moisture well, second cuttings may extend this period to July 10.

The use of grains alone or in combination with vetch makes possible early green feed. Vetch is usually harvested early enough to allow the land to be cultivated and used for other crops such as kale or rape.

Vetch responds to the use of land-plaster and an application of 75 pounds an acre is often profitable. It should be applied early in March. Sometimes early spring applications of sulphate of ammonia make large increases in yield; this is most likely to take place where the land is not heavily manured.

Kale and cabbage. Kale is highly prized in Western Oregon because of its palatability and its high protein and ash content. Thousand-headed kale is the best variety. It makes vigorous growth, is quite winter hardy for most of Western Oregon and produces a large amount of feed over a long period.

Kale grows best on fertile, well drained land. The latter is especially important for winter feed.

Application of 10 to 20 tons of manure an acre will increase yields very materially. Fertilizers well supplied with nitrogen and phosphorus

may be helpful. Phosphorus seems to make the plants more winter hardy. Kale will winter-kill easily in wet, soggy land.

The plants are usually grown in a bed and transplanted rather deeply. Some growers seed direct in the field and thin. This practice is not recommended where plants are expected to remain in the field during the winter because the rooting system is shallow, the heavy tops develop too high and many plants fall over. Deep transplanting, such as 5 to 6 inches, makes a deeper rooting system, a lower top development, and the plants remain more upright and are less injured by cold. Plants are ready to set when they have six to seven true leaves. Thorough cultivation is necessary to keep down weeds and retain moisture.

Kale may be planted during a fairly long period of the spring. Seeding in late March or early April or transplanting in late April usually produces a growth which may be used as summer feed. Because of the tendency of early kale to be strong and to go to seed, it is probable that summer cabbage is better in many cases.

From the standpoint of yield of fall and winter green feed, late spring or early summer transplantings of kale made from June 1 to July 1 are in most cases more satisfactory. These plants usually escape root-maggot injury and do not go to seed until the following spring. When planted at this time the land must be in excellent tilth and have ample summer moisture available to start and keep the plants growing.

Kale is quite winter hardy and when temperatures do not go below 13° F. there is usually little injury on well drained land. Below that all except the hardiest plants may be badly damaged unless they are covered with snow.

It takes about 5,000 kale plants for an acre when set 36 inches each way. One pound of good seed will produce enough strong plants for an acre.

In some sections cabbage offers a possibility for green feed and may in some cases be stored for winter feed. Where cabbage, broccoli, and cauliflower are commercial crops, the waste foliage may be used for poultry feeding purposes.

Rape. Rape is not generally recommended but in some cases may be useful. It is a summer crop probably better suited to growing stock than to laying birds, because of the greenish yolk color produced.

Two varieties of rape, Dwarf Essex and Victoria, are most commonly grown for poultry green feed.

Rape is usually considered as a catch crop, occupying the land for short periods or at times when it is desired to have a crop on the land between two more regular season crops. It responds readily to irrigation.

Rape may be seeded any time from April 15 until June 20 that a reasonably fine seedbed can be made. It makes rapid growth if sufficient moisture is available to start it. Once started, the plants will endure considerable dry weather.

On land that has been used for growing a small grain or small grain and vetch combination and has had the crop removed early, a good crop of rape can often be grown if seeded late in June or early in July.

Seedings are sometimes made in early May on a well prepared seedbed with the idea that the crop is to occupy the land all summer and be used

for green feed during that time. Red clover is often started by sowing it with the rape. The clover is available for use the following year.

Rape should be seeded at the rate of 5 pounds an acre alone or with 10 to 12 pounds of red clover, or 15 pounds of crimson clover.

Clover. The use of clover as poultry green feed is in the introductory stage. It is valuable where ample land is available and a short-lived perennial sod is desired. It often makes a heavy and suitable summer growth. Where frequently cut it is very tender and palatable. More mature clover is perhaps not consumed quite so readily as some other crops but makes a feed of high quality. Alsike is better on some soils too sour and wet for red clover. Some use may be made of alsike clover, but it is short-lived and does not recover from cuttings as well as red clover, except on rich irrigated soils. Where a winter grain crop is grown these clovers may be sowed in it in early spring and if ample moisture is available good stands may be obtained. This is especially true when the grain is cut for green feed. Seedings may be made alone or with rape on a well prepared seedbed in April or May. This is the surest way to get a stand. A fine, firm seedbed must be provided. The first year red clover usually provides only a small amount of feed. Beginning with the second year, large amounts of feed are obtained either as cut or pastured material. A good stand should last two years after seeding. Twelve pounds of seed of red clover should be used.

The New Giant Italian White or Ladino clover is one of the most promising perennial poultry green feed and pasture crops for Western Oregon. It is durable, palatable, nutritious, and yields well. It is something of a sod former and affords soil protection. It starts early and grows late where plenty of moisture is available. It is especially suited to irrigated soils too shallow or a little too sour for alfalfa. It is shallow rooted and dries up on unirrigated land during late June or July.

Ladino clover is usually sowed alone on a firm, fine seedbed in April, May, or June. Three to 5 pounds of seed an acre are usually used. It is often sowed with grasses. A good mixture is 5 pounds rye grass, 3 pounds timothy, 3 pounds orchard grass, and 2 pounds Ladino clover.

Common white or Little Dutch clover may be used as a constituent of a permanent sod mixture, but seeded alone it has little value. The amount of green feed produced is usually low. It is primarily a pasture clover.

Crimson clover is a rapid-growing, winter-hardy, short-lived legume. If seeded in combination with domestic rye grass September 1 to October 15, a succulent, rapid-growing, late-fall, winter and spring poultry pasture may be grown. This crop can be broken up about May 1 and followed by rape. Common crimson clover sometimes freezes out during severe winters, so seed of the Tennessee hardy strain should be used whenever possible.

When a shorter-lived, more rapid growing legume is wanted for seeding with rape, crimson clover may be used. This clover will grow on lands too poor for red clover. It may be utilized the following spring also, but should not be depended upon to produce much pasture after May 1 of the second year.

White or yellow flowered sweet clover is a high-producing, deep-rooted biennial crop, making satisfactory yields on reasonably well-drained soils too sour or too shallow for alfalfa. A fine, firm, weed-free seedbed as for

alfalfa is desirable. Seeding can be done between April 15 and June 15, at the rate of 15 to 20 pounds per acre. Thick stands of sweet clover are desirable for poultry pasture because of greater production of leaves and fine stems. On irrigated lands, a nurse crop such as spring grain, seeded at 6 pecks per acre may be profitably used. Inoculation of the seed or land is necessary where successful stands of sweet clover or alfalfa have not occupied the land during the previous two years. West of the Cascade Mountains, the Willamette strain of white flowered sweet clover should be planted to eliminate danger of crop loss by stem rot.

Thin stands of clover may often be thickened successfully by sowing in rye grass seed in the early fall. Common domestic rye grass is best for short time use while English rye grass is better adapted for a longer time sod.

An application of 75 pounds of land plaster an acre increases the yield of clovers materially. Apply early in March.

Alfalfa. The use of alfalfa as a green feed for poultry shows great possibilities in both Eastern and Western Oregon. A good stand properly handled will produce an abundance of spring, summer, and early fall green feed for poultry for periods of from three to seven or more years after seeding. The feed is of high quality and poultry consume it very readily either cut or pastured.

Land suitable for alfalfa must be well drained, deep, mellow, sweet, and of reasonably good fertility. Sour soil should be liberally limed. Land should be rolled and thoroughly cultivated several times before seeding to make sure that the seedbed is fine, firm, and free from weeds. An application of land plaster put on the field in March or early April helps to make good stands. Seedings should be made alone unless ample irrigation is possible. Under this condition spring oats or spring barley seeded at 2 bushels per acre may be used to advantage. When seeded alone the seedings are made in May or early June, using 12 to 15 pounds of seed an acre. It is best to sow certified Grimm alfalfa, except on some unirrigated dry lands in Eastern and Southern Oregon, or where alfalfa wilt is present, in which cases certified Ladak alfalfa may be more productive.

It is necessary to inoculate the seed or the land on which it is to be grown, if alfalfa has not been growing successfully on it within the past two years. If sowed on rich land or if the crop is irrigated, it will usually make enough growth the first season so that in early fall some green feed can be obtained. It is not advisable under any condition to cut the crop too early the first year because that weakens the plants. It is better to get the plants well established. An application of 125 pounds of land plaster or 35 pounds of sulphur in the early spring will stimulate growth in most sections of Oregon and result in a large increase in green feed.

Alfalfa responds very readily to irrigation. Where water for this purpose is available cheaply enough, it pays to irrigate.

Alfalfa is so valuable as a summer green feed that poultrymen are often justified in an unusual expense to make it grow successfully. Heavy liming or summer irrigation is frequently quite worth while.

Dry alfalfa leaves and blossoms are highly prized as a substitute for green feed.

In Southern and Eastern Oregon, *Poa bulbosa*, also known as bulbous blue grass or winter blue grass, will grow well with alfalfa. This perennial

grass makes considerable pasture during the moist fall, winter and early spring months, when alfalfa is dormant. Fall seedings can be made at 20 pounds per acre on established alfalfa sod.

Root crops. Roots fill an important place in the fresh feed program of poultry and are especially valuable for winter use when other succulent feed is not available.

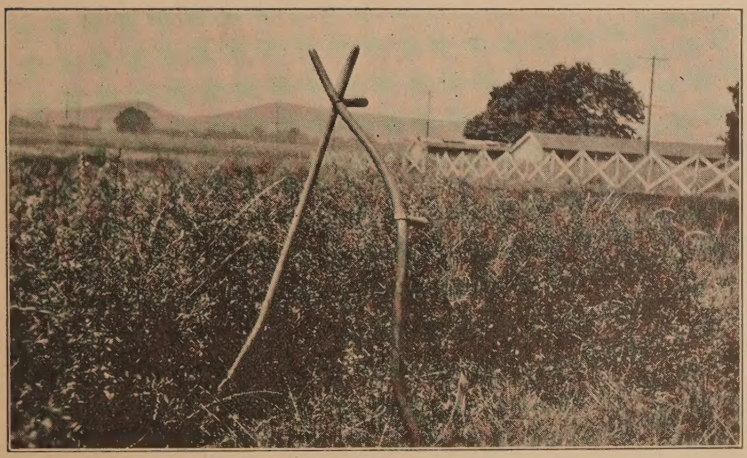

Figure 3. Alfalfa green feed convenient to the yards.

Figure 4. Root crops for fresh feed during freezing weather.

Those of most general value for poultry in both Eastern and Western Oregon are mangels and carrots. Turnips and rutabagas are of little value.

Mangels and carrots are grown primarily for the roots. The tops of mangels have some value but those of carrots little value for poultry feed.

These roots require a fine, firm, well fertilized seedbed as free from weeds as possible before seeding is done. Fertilization of land to be used for root crops with 10 to 20 tons of manure per acre supplemented with treble phosphate increases yields materially. Seedings are made with a garden drill early in May. Rows are spaced at 18 to 36 inches apart depending on how they are to be cultivated. Eight to 10 pounds of mangel seed and 3 pounds of carrot seed are required for an acre. Mangels are thinned, after the seedlings have their fourth permanent leaf, to single strong plants 10 to 12 inches apart. Carrots are sometimes thinned to 4 to 6 inches apart but they are usually not thinned. Several cultivations should be given during the growing season.

The highest yielding varieties of mangels in many sections are Prize-winner, Giant Half Sugar, Giant Intermediate, Heavy Cropper, Danish Sludstrup, and Mammoth Long Red. Poultry consume all these varieties equally well. The orange fleshed varieties of carrots are considered better for poultry than those with white flesh. Chantenay and Yellow Giant are good yielders in all sections of the state and have high quality. Mangels generally outyield carrots except in Eastern Oregon in years of serious leaf-hopper infection.

These roots grow well under irrigation. Mangels produce good yields under rather dry conditions if proper cultivation is given.

Mangels and carrots should be pulled for storage before heavy frosts. While these roots can stand considerable freezing without appreciable injury, any damage done by freezing reduces their ability to stand up in storage. After pulling, the tops should be twisted or cut off, injuring the root as little as possible. The roots should be left in the field to dry before storing. This allows the earth to dry out and drop off and the root gets cooled out before storing. It is best to store roots on a slatted floor allowing ventilation up through the pile. Storage conditions for potatoes are excellent for these roots. They should be kept in a cool, dry, dark place and have ventilation while in storage. When properly handled they will remain in good condition until late spring.

Grass seedings. Grasses from the poultry-pasture standpoint have to do mainly with their use as sod in yards and runs and should be perennials that can grow under rather adverse conditions. A mixture of grasses usually produces better sod and more material for poultry than seedings of one kind. For sections where ample moisture is available for grass during most of the year a mixture of English rye grass, 10 pounds, orchard grass, 3 pounds, Kentucky blue grass, 5 pounds, redtop, 3 pounds, and Ladino clover, 2 pounds, makes a quick covering of the ground and a heavy sod. Seeding should be done in the early fall or early spring on a well prepared, firm seedbed. The seed is broadcast and harrowed or raked in lightly. Poultry should be kept off during the winter, spring, and early summer of the first year, thus giving the plants time to get well rooted. As the stand gets thin, reseeding each fall with a small amount of new seed will help maintain and lengthen its life. It is good practice to keep poultry off these grass areas during very wet weather as tramping and scratching at that time do much injury.

In dry sections there are few grasses that will be very successful for long periods. Tall oat grass, orchard grass, and Chewing's fescue are good dry-land grasses but are not as productive of feed as spring-sowed fall grains, corn, or thin stands of alfalfa which are given cultivation. Under Eastern and Western Oregon dry conditions seedings of varieties with cheap seed such as rye grass can be made each fall and considerable green material will be available during the spring and early summer of the following year. Seedings should be at the rate of 25 to 30 pounds an acre.

Sudan grass is sometimes used as pasture by producers of turkeys and geese in the Willamette Valley and Southern Oregon. This annual grass is a rapid grower during warm weather and requires close pasturing; unless pastured closely it may become too coarse for general use in feeding smaller types of poultry. When the growth becomes spotted or uneven, turkey raisers often practice clipping to even the growth and prevent the birds from "bunching up" in the field, on the closely pastured spots. Seeding should be delayed until the soil is warm, usually between May 1 and June 15. Earlier seedings are usually unsatisfactory. The rate of seeding is 25 to 35 pounds per acre. After early fall frosts Sudan grass should be pastured with care on account of the danger of sorghum poisoning. This risk can be tested by allowing a few birds to pasture for a few days after the frost and observing the effects.

HARVEST METHODS: PREPARATION FOR FEEDING

Poultry will consume most readily the young succulent growth. When allowed to select their own green material they usually choose the newer growths because they are tender, in smaller sections, and fresher. When material is harvested for fresh feed it should be cut each day so that it will be as nearly fresh as possible when fed.

Grains and vetch grown alone or in combination may be cut but are often pastured off. Close pasturing of these crops must be avoided until the crops are well started. The poultry is allowed to spend an hour or two in the planting each day when the crops are young. As the plants get older the poultry may be pastured longer. Where large flocks are to obtain green feed from small areas the pasture should be divided and alternate or rotation pasturing practiced. This gives the plants opportunity to increase growth and produce more feed. These crops should not be eaten down so closely that rapid subsequent growth will not take place.

When cut and fed, it is best to begin when the plants are still tender and succulent. When cut early, good second crops are practically always produced and the feeding period during which very succulent feed is produced is lengthened.

These crops provide good succession of feed, barley being ready first, followed by rye, wheat, oats, and vetch.

Where vetch is seeded with these grains it increases both the quantity and quality of the feed.

These crops when harvested to be fed are often cut with a feed cutter so that better utilization is made of them. The pieces should be small, not more than one-fourth inch long. This green material should never be allowed to remain long in a pile as it soon heats and is not so good.

Kale is sometimes pastured off. More often, however, it is harvested and taken to the poultry. When plants have made large growth they are often stripped by taking off the larger lower leaves. These are either run through a cutter or tied into bunches for the birds to pick. Many poultrymen, beginning with early fall, cut off the plants and either run the softer parts through a cutter or hang the plant up and allow the birds to pick off the leaves and tender stems.

Rape is practically always pastured off. Occasionally where the growth is large, leaves are picked. By careful pasturing and alternate use of small areas increased feed is obtained; since rape, if not eaten down too heavily, recuperates very rapidly.

Figure 5. Rape is a good poultry yard crop.

Clover of the larger growing varieties such as red and alsike is either pastured or harvested and fed. When harvested, it is run through a cutter or tied in bunches to be picked. The season for clover, especially red, is long and after it is eaten or cut off it comes back quickly and makes successive crops. Clover responds to irrigation readily. Alsike makes much less feed than red and often lasts but one year whereas red is usually good for at least two years. Ladino clover is good for both cutting and pasturing and is long lived. White clover is only good for pasture as it seldom gets large enough to harvest profitably. Sweet clover is pastured during late summer and fall of the first year, and spring and early summer of the second year. During the second year it should be pastured heavily and clipped if the growth gets beyond the tender, leafy pasture stage. Only the Willamette variety of biennial white sweet clover is recommended for Western Oregon. It is resistant to the disease, stem rot.

Alfalfa is either pastured or mowed and run through a cutter before feeding. Continuous early cutting of alfalfa shortens the life of the stand. The best stage for cutting from the standpoint of the life of the stand is

from the beginning of blooming period to full bloom. Feed demands often require earlier cutting. If cut early and often, the length of life is decidedly shortened. Pasturing continually has somewhat similar effects. Rotation pasturing or cutting is recommended. By rotating the early and late cut portions of the field, vigor and life of the stand may be maintained, and the plants are injured but little. On the pastured areas it is advisable to cut any remaining growth at the bloom stage so as to clean up the patch and induce production of a new crop.

Roots are used for winter green or succulent feed and taken from storage as necessary. Roots are often split and checked with a knife, in order to induce poultry to eat them. To hold roots stationary for picking they are often nailed to blocks of wood or to the wall. They should be fed in a clean place.

Grass is usually used for making a sod, and any green feed obtained from it is in the form of pasture. It is seldom practicable to harvest and chop it or tie it in bundles in the pens; because the quality at the time it is large enough for this is poor, and only a small amount is consumed.

Field and sweet corn may have considerable use as a green feed in middle to late summer, if early and late varieties are used, and with a series of plantings may be available from mid August until frost. Any corn not used will make good grain if early ripening varieties are chosen. The flint varieties are often early and leafy, while Minnesota No. 13 at different planting dates provides later feed. Chopped green corn makes good green feed until the grain reaches the roasting-ear stage.

Lettuce, cabbage, and curly kale are often available for poultry feed. These are very good feed if fresh and clean, but it is not generally advisable to grow them for that purpose exclusively because the amount of feed produced is too small and the crop is often too expensive and difficult to grow. Chicken lettuce, a non-heading, tall-growing plant resembling lettuce in leaf appearance, produces large amounts of feed on rich land and is being used to some extent.

Lawn clippings are often used. If fresh and short, large amounts are consumed, especially if well supplied with the small clovers.

Sunflowers are used successfully for pasture and summer shade by poultrymen, especially turkey raisers. They provide an abundance of shade and large amounts of green feed from the leaves, and the seeds are good feed. Yields of seed are comparable to corn in bushels per acre. Seeding time varies from April 15 in Southern Oregon to May 15 in the Willamette Valley and Eastern Oregon. The crop is usually grown in rows 24 to 48 inches apart, the plants being spaced 10 to 18 inches apart in the rows. Closer spacings are used where soil fertility and moisture are abundant. Seeding is done at the rate of 8 to 12 pounds per acre on a well prepared seedbed. The most commonly grown varieties are Mammoth Russian and Manchurian, the latter being favored by some poultrymen because of its shorter growth and earlier maturity. Pasturing may begin when the earliest flowers begin to blossom. The seeds reach maturity as early as September 1 in Southern Oregon. A common harvesting practice is to break down the sunflower stalks and allow the birds to harvest the matured seed in the field. To prevent turkeys from "bunching up", it is good practice to break down plants in several portions of the sunflower field each day. One acre of sunflowers is considered sufficient for 100 to 125 turkeys.

POULTRY GREEN FEED CROP SUCCESSION

To maintain a supply of green feed for poultry throughout the year a rather definite system of crop rotation must be followed so as to utilize the land fully and be reasonably certain that green feed will be on hand at all times. Much depends on the location and climate.

The following crop successions are practical under the conditions mentioned and during ordinary years supply continuously large amounts of good feed.

Table 1. WILLAMETTE VALLEY WELL DRAINED LANDS, USING ALFALFA.

Crop	Time seeded	Time usable
Small grains. Winter barley, rye, wheat, oats	September 1 to October 15	March 15 to June 15
Vetch or grain and vetch	September 1 to October 15	April 1 to July 1
Alfalfa, established	May 1 to 15	April 15 to October 1
Sunflowers	April 15 to May 15	August 15 to October 1
Sudan grass	May 1 to June 1	July 1 to September 15
Kale, Thousand Headed	April seed, June transplant	October 1 to March 1
Roots, mangels, carrots	May 1 to 10	October 15 to May 1

Table 2. WILLAMETTE VALLEY HEAVY LANDS WITH SOME SUMMER IRRIGATION.

Crop	Time seeded	Time usable
Small grains such as barley or rye	September 1 to October 15	March 15 to June 15
Vetch or vetch and rye or oats	September 1 to October 15	April 1 to July 1
Ladino clover established	April 15 to May 15	April 15 to October 15
Sunflowers	April 15 to May 15	August 15 to October 1
Kale	April seed, June transplant	October 1 to March 1
Roots	May 1 to 10	October 15 to May 1

Table 3. WILLAMETTE VALLEY WELL DRAINED LANDS NOT IRRIGATED.

Crop	Time seeded	Time usable
Crimson clover and domestic rye grass	September 1 to October 15	April 1 to June 1
Small grains as barley or rye	September 1 to October 15	March 15 to June 15
Vetch or vetch and rye or oats	September 1 to October 15	April 1 to July 1
Sweet clover	April 15 to June 15	August 15 to October 1 and April 15 to August 15
Red clover established	February to June	April 15 to August 15
Corn or sunflowers	May 1 to 15	August 15 to October 1
Rape or summer cabbage	April to June	August 1 to October 1
Kale	April seed, June transplant	October 1 to March 1
Roots	May 1 to 10	October 15 to May 1
Sudan grass	May 1 to June 15	July 1 to October 1

Table 4. COAST SECTION.

Crop	Time seeded	Time usable
Small grain, winter rye, oats	September 15 to October 15	April 15 to June 15
Vetch or grain and vetch	September 15 to October 15	April 15 to July 1
Spring oats and field peas (Blue Prussian)	April 1 to 15	May 15 to July 20
Kale, Thousand Headed	April seed, June 1 transplant	July 15 to March 1
Japanese barnyard millet	May 15 to June 15	July 15 to October 1
Roots, mangels, carrots	May 15 to June 1	October 15 to April 15
Grass mixed with Ladino or white clover	October 1	January 1 to December 31

Table 5. IRRIGATED SECTIONS, EASTERN OREGON.

Crop	Time seeded	Time usable
Winter wheat or rye	October 1	May 1 to June 15
Alfalfa	May 1 to June 1	May 15 to October 1
Ladino clover	May 1 to June 1	May 1 to October 1
Red clover	May 1 to June 1	May 15 to October 1
Roots, mangels, carrots	May 1 to 15	September 15 to May 15
Sudan grass	May 15 to June 1	July 1 to September 15
Sunflowers	April 15 to May 10	August 15 to October 1

Table 6. UNIRRIGATED SECTIONS, EASTERN OREGON.

Crop	Time seeded	Time usable
Winter grain, wheat, rye	September 1 to October 1	April 15 to June 15
Spring grain, wheat, oats, barley	March 1 to April 1	May 15 to July 10
Spring planted—		
fall wheat or rye	March 1 to 15	Pasture June to October 1
Alfalfa in cultivated rows	April 1 to May 1	May 1 to September 1
Corn or sunflowers	April 15 to May 10	August 15 to September 15
Sudan grass	May 15 to June 1	July 1 to September 15
Roots, mangels	April 15	September 15 to May 1

Table 7. SOUTHERN OREGON IRRIGATED.

Crop	Time seeded	Time usable
Winter grain, barley, rye, wheat, oats	September 15 to October 15	March 1 to June 1
Vetch or vetch and grain	September 15 to October 15	March 15 to June 15
Alfalfa	April 15 to May 15	April 1 to October 15
Red clover	February to May	April 15 to July 15
Ladino clover	April 1 to May 1	April 1 to October 15
Corn	April 20 to May 10	August 15 to October 1
Sunflowers	April 15 to May 1	August 10 to October 1
Kale	April seed, June transplant	October 15 to March 1
Rape	April 15 to June 1	June 1 to September 1
Sudan grass	May 1 to June 1	July 1 to October 1
Roots, mangels, carrots	May 1 to 10	October 15 to April 15
Grass	September 15 to October 15	January 1 to December 31

The individual poultryman will necessarily have to decide what crops he will grow to meet effectively the soil, moisture and climatic conditions he has to deal with. Any plan followed should be such that the land be fully utilized, good use made of manure produced by the poultry, and a continual supply of fresh feed produced for the flock.

A crop rotation system should also be followed for purposes of better sanitation and increased crop yields. It is advisable to use manure on land to be plowed, as plowing buries it and the decay is beneath the surface. Cultivated crops usually make best use of manure. Crops that follow also benefit proportionately.

The amount of green feed produced by various crops in different locations is so variable that any estimate might be misleading. The amount will vary according to soil, climatic conditions, time and manner of harvesting, and variety used.

Calculated on the acre basis and considering the general harvest at an early stage before maximum weight is obtained, the various crops that

can be grown for poultry green feed under ordinary good farming conditions may be expected to yield somewhat as here indicated.

Crop	Average yield green material in tons an acre
Winter barley	5.
Winter oats	7.
Winter wheat	7.
Winter rye	6.
Vetch	9.
Vetch and grain	9.
Kale	20.
Rape	6.
Clover	10.
Alfalfa	15.
Mangels	20.
Carrots	12.
Grass (mixture)	3. to 8.
Sunflowers (mature seeds included)	15.
Sudan grass	8.

GREEN FEED SUBSTITUTES

In some sections the poultry industry is conducted on land so high priced that the poultryman cannot afford to use much of it for the production of green feed. In other sections the land will grow only such a small amount that it is not profitable to try to grow a year-round supply.

Under these conditions it is necessary to substitute materials that when consumed by poultry will answer the purpose and be practically as beneficial as fresh green feed.

The best substitutes are alfalfa and clover hay. These kinds of hay should be sweet, green in color, well cured, and leafy. The second and third cuttings of alfalfa are best, as the proportion of leaf to stem is usually larger and it is the leafy parts of the plant that contain most of the proteins and vitamins.

This hay may be chopped in one-fourth to one-half inch lengths and fed from screened hoppers, or it may be fed in racks, unchopped. It may also be tied in bundles and suspended within easy reach of the birds.

Ground alfalfa, when made from green, leafy, well cured alfalfa hay, is a satisfactory wet or dry feed. Ground hay made from inferior stock is likely to be poor in feed value, very dusty, and should be avoided.

Alfalfa and clover hay are not expected to replace fresh green feeds. During times when green feeds are not available or in sections where they cannot be grown profitably these substitutes can be used for a part of the year at least, with good success.

It is not practicable to cover all the conditions here. Directions for the general culture of several of the crops included in this circular may be had upon request to Oregon State College. Special problems will be given attention if they are presented to the Experiment Station.